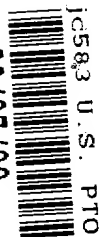


02/27/98



A

## PATENT APPLICATION TRANSMITTAL LETTER

ATTORNEY'S DOCKET NO.

Hennhöfer et al.

TO THE COMMISSIONER OF PATENTS AND TRADEMARKS:

Transmitted herewith for filing is a patent application of Heinrich HENNHÖFER, Thomas BUSCHHARDT, Franz MANGS, and Gerlinde WENSAUER

**FOR: PROCESS FOR TREATING A POLISHED SEMICONDUCTOR WAFER IMMEDIATELY AFTER THE SEMICONDUCTOR WAFER HAS BEEN POLISHED**

ENCLOSED ARE:

- ☐ \_\_\_\_\_ sheet(s) of formal drawing(s)  
☐ \_\_\_\_\_ sheet(s) of informal drawing(s)  
☒ an Assignment of the invention, with required cover sheet, to  
Wacker Siltronic Gesellschaft für Halbleitermaterialien AG  
☒ Priority is claimed under 35 USC 119 for the following application(s):  
German No. 197 09 217.9 of 6 March 1997  
☒ a certified copy of the aforesaid application is enclosed.  
☐ a certified copy of the aforesaid application will be submitted in due course.  
☐ Associate Power of Attorney enclosed.

## CLAIMS AS FILED

FOR	NUMBER FILED	NUMBER EXTRA	RATE	FEE
TOTAL CLAIMS	12 — 20	0	X \$ 22.00	\$ 0.00
INDEPENDENT CLAIMS	1 - 3	0	X \$ 82.00	\$ 0.00
BASIC FEE (\$790)				
REDUCED FEE (\$395)	<input type="checkbox"/> Independent Inventor	<input type="checkbox"/> Small Business Concern		\$ 790.00
TOTAL FILING FEE:				\$ 790.00

- ☐ Verified Statement of ☐ Independent Inventor ☐ Small Business Concern
- ☒ The Commissioner is hereby authorized to charge any additional fees which may be required at any time during the prosecution of this application without specific authorization, except for the Base Issue Fee, or credit any overpayment to Deposit Account No. 03-2468. A duplicate copy of this sheet is enclosed.
- ☒ A check in the amount of \$ 830.00 is enclosed. This check covers:  
☐ the filing fee  
☒ the filing fee and the Assignment recordal fee.
- ☐ Other \_\_\_\_\_

February 27, 1998  
Date

*Edward R. Freedman*  
Allison C. Collard  
Edward R. Freedman, Reg. No. 26,048  
COLLARD & ROE, P.C.  
1077 Northern Boulevard  
Roslyn, New York 11576  
Telephone: (516) 365-9802

**"EXPRESS MAIL" NO. EL 039 738 485 US**

Date of Deposit February 27, 1998

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*Maureen E. Bitz*  
Maureen Bitz



0120

0200  
0377

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Fenghua Liu et al.

Serial No.: 09/032,305

Art Unit:

Filed: 02/27/98

Examiner:

Title: Vector Quantization in CELP Speech Coder

Attorney Docket No.: 365P007118-US (PAR)

Commissioner of Patents and Trademarks  
Washington DC 20231

PRELIMINARY AMENDMENT

Sir:

Prior to the examination of this application please amend the application as follows:

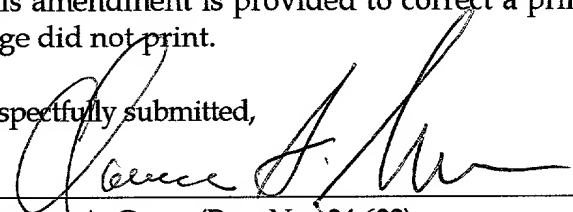
Page 2, line 37, delete "removing" (second occurrence).

Page 2, line 37, after this line insert: - -and one for extracting pitch to enhance the synthesized- -.

REMARKS

This amendment is provided to correct a printing error. It appears that the last line of the page did not print.

Respectfully submitted,

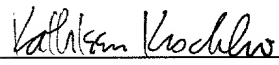
  
Clarence A. Green (Reg. No.: 24,622)  
Perman & Green, LLP  
425 Post Road  
Fairfield CT 06430

3/19/98  
Date

Telephone: 203/259-1800  
Facsimile: 203/255-5170

CERTIFICATE OF MAILING

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Name of Person Making Deposit

3.19.98  
Date

UNITED STATES SPECIFICATION

TO ALL WHOM IT MAY CONCERN:

BE IT KNOWN THAT WE, HEINRICH HENNHÖFER, THOMAS BUSCHHARDT, FRANZ MANGS and GERLINDE WENSAUER, all German citizens, respectively residing at Sr.-Edith-Stein-Strasse 5, D-84503 Altoetting, Germany; Am Forstpoint 18, D-84489 Burghausen, Germany; Ranharting 8, D-84569 Tittmoning, Germany; and Kolpingstrasse 20, D-84503 Altoetting, Germany; have invented certain new and useful improvements in a

PROCESS FOR TREATING A POLISHED  
SEMICONDUCTOR WAFER IMMEDIATELY AFTER THE  
SEMICONDUCTOR WAFER HAS BEEN POLISHED

of which the following is a specification.

## BACKGROUND OF THE INVENTION

### 1. Field of the Invention

The present invention relates to a process for treating a polished semiconductor wafer immediately after the semiconductor wafer has been polished.

### 2. The Prior Art

Polishing the semiconductor wafer represents the final step in the production of the semiconductor wafer and has a decisive influence on the shaping of the semiconductor wafer. The object of the polishing is to create a surface which is as planar, smooth and defect-free as possible on at least one of the two sides of the semiconductor wafer. Such a surface is absolutely imperative if it is to be possible to accommodate functioning electronic structures in high density on the semiconductor wafer. Certain defects on the surface of the semiconductor wafer may later lead to an electronic component failing. These defects can be recognized by a characteristic light scattering behavior and can be indicated in terms of size and number as so-called LPDs (light point defects).

Single side and double side polishing processes are usually employed to polish a semiconductor wafer. In the case of single side polishing (SSP), after the rear side of the semiconductor wafer has been mounted on a suitable support, only the front side

is polished. This is done by using a polishing cloth stretched over a polishing plate. On mounting, a form-fitting and force-fitting connection is produced between the rear side and the support. This connection can be, for example by adhesion, adhesive bonding, cementing or the application of a vacuum. Single side polishing processes and devices are usual for single wafer polishing or for polishing batches of wafers. In the case of double side polishing (DSP), the front side and the rear side are polished simultaneously. This is done by guiding a plurality of semiconductor wafers between two, i.e. - upper and lower, polishing plates over which polishing cloths are stretched. In this case, the semiconductor wafers are positioned in thin wafer carriers, which carriers are also used in a similar arrangement when lapping the semiconductor wafers.

The polished surface of a semiconductor wafer has hydrophobic properties. It is very sensitive to uncontrolled chemical attack from an etching agent and it promotes the deposition of particles. Both of these problems can lead to a relatively rapid increase in the number of LPDs. Such an increase in LPD can be avoided by ensuring that the environment is as free of particles as possible. Also the uncontrolled chemical attack from residues of polishing abrasive is suppressed by transferring the semiconductor wafer into a flushing bath or a cleaning bath immediately after the polishing.

On the other hand, it is still possible to observe a rise in the number of LPDs over time even if the semiconductor wafer is stored in deionized water immediately after polishing and is only subsequently subjected to a conventional cleaning procedure. However, in the mass production of semiconductor wafers, waiting times between the polishing and the cleaning of a polished semiconductor wafer are frequently desirable for technical and economic reasons. If every semiconductor wafer had to be cleaned immediately after polishing, single wafer polishing would be necessary. It is very complex technically to achieve this through batch polishing and the process is correspondingly expensive.

#### SUMMARY OF THE INVENTION

It is an object of the present invention to provide a process for counteracting the considerable increase in the number of LPDs occurring when a polished semiconductor wafer is not cleaned immediately after the polishing, but rather is stored before it is later cleaned.

The present invention is directed to a process for treating a polished semiconductor wafer comprising polishing a surface of a semiconductor wafer; and immediately after polishing the semiconductor wafer, bringing the semiconductor wafer into contact

with an aqueous treatment agent solution for oxidizing the polished surface by action of the aqueous treatment agent solution.

The polished surface of the semiconductor wafer is then coated with a thin film of oxide and has hydrophilic properties. As a result, the semiconductor wafer is less sensitive to residues of polishing abrasive and to particles. After the oxidizing treatment, it can be stored and cleaned in the usual way only at a later time without the risk of having the number of LPDs increase considerably during the storage time.

The treatment agent utilized is an aqueous, oxidizing and alkaline solution. The action of such a solution results in a thin, passivating oxide film present on the polished surface of the semiconductor wafer. It is preferred for the aqueous treatment agent solution to contain hydrogen peroxide ( $H_2O_2$ ) as the oxidizing agent along with an alkaline component. This alkaline component is preferably selected from a group of compounds comprising tetramethylammonium hydroxide, ammonium hydroxide, potassium hydroxide, sodium hydroxide, potassium carbonate and mixtures of these compounds.

It is particularly desirable to use an aqueous treatment agent solution which contains the oxidizing agent in a concentration of from 0.02% to 3.0% by volume, preferably from 0.5% to 2.5% by

volume, and most preferably from 1% to 2% by volume, based on the total solution volume and the alkaline component in a concentration of from 0.01% to 2.0% by weight, preferably from 0.5% to 1.7% by weight, and most preferably from 0.75% to 1.5% by weight, based upon the total solution weight. The aqueous treatment agent is used at a temperature ranging from 18°C to 65°C. The balance up to 100% by volume, or up to 100% by weight, is water and is based upon the respective total solution volume, or upon the total solution weight.

Furthermore, it has been found that a certain degree of passivation of the polished surface of the semiconductor wafer also occurs if the semiconductor wafer is treated with a surfactant-containing cleaning agent or solution.

The semiconductor wafer can be brought into contact with the treatment agent in various ways. This contact can take place while the semiconductor wafer is still lying on the polishing plate. On the other hand, the semiconductor wafer may also first be removed from the polishing plate and then transferred to a different substrate or into a holder. Accordingly, the oxidizing treatment preferably takes place in the polishing machine or in an unloading station which is connected thereto. The oxidizing treatment can be performed by bringing the polished surface of the semiconductor wafer into contact with a cloth which has been moistened with the



aqueous treatment agent or by spraying the polished surface with the treatment agent solution. The semiconductor wafer can also be dipped into a bath of the treatment agent. Treatment using a moistened cloth is preferably carried out in the same way as a polishing operation. Here, the cloth which has been moistened with the aqueous treatment agent solution takes the place of the polishing cloth, and a polishing abrasive is dispensed with.

It is desirable to flush the treatment agent off the semiconductor wafer after the oxidizing treatment is completed, preferably using deionized water. Therefore, the semiconductor wafer is sufficiently protected against undesired attack by a polishing abrasive. The wafer can be stored until it is cleaned in the usual manner, preferably also by using deionized water. The storage time is preferably 15 to 180 minutes, particularly preferably 15 to 30 minutes. The semiconductor wafer is then cleaned. It is preferred to begin cleaning by treating the semiconductor wafer with dilute hydrofluoric acid, which removes the oxide film. The further cleaning of the semiconductor wafer may then comprise, for example, the known RCA cleaning process or a variant of this process.

## DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

The process of the invention was tested on silicon wafers. To do so, test wafers were treated according to the invention immediately after a standard polishing operation and were then stored in deionized water. The wafers were subsequently subjected to final cleaning, were dried and were examined for LPDs using a commercially available analysis apparatus. Further silicon wafers, as comparative wafers, were polished in the same way, stored in deionized water and cleaned. These comparative wafers were not treated according to the process of the invention immediately after polishing.

The aqueous treatment agent solution utilized according to the invention was an aqueous solution containing 1.5% by volume of hydrogen peroxide and 1.0% by weight of sodium hydroxide, with the balance up to 100% being water. The temperature was 25°C.

The following Table lists the results of the LPD determination. The number given represents the total LPDs  $> 0.12 \mu\text{m}$  found. The reference parameter is the number of LPDs found on the comparative wafers of type I, normalized to 100%.

TABLE

<u>Type of wafer</u>	<u>Length of storage</u>	<u>LPDs [%]</u>
Test wafers I	no storage	136
Comparative wafers I	no storage	100
Test wafers II	3 hours	96
Comparative wafers II	3 hours	400
Test wafers III	5 hours	727
Comparative wafers III	5 hours	1,878

While several embodiments of the present invention have been shown and described, it is to be understood that many changes and modifications may be made thereunto without departing from the spirit and scope of the invention as defined in the appended claims.

WHAT IS CLAIMED IS:

1. Process for treating a polished semiconductor wafer comprising

polishing a surface of a semiconductor wafer; and

immediately after polishing the semiconductor wafer, bringing the semiconductor wafer into contact with an aqueous treatment agent solution for oxidizing the polished surface by action of the aqueous treatment agent solution.

2. Process according to Claim 1, comprising

bringing the semiconductor wafer into contact with the aqueous treatment agent solution containing an oxidizing agent and an alkaline component.

3. Process according to Claim 1, comprising

bringing the aqueous treatment agent solution into contact with the semiconductor wafer by spraying the semiconductor wafer with the aqueous treatment agent solution.

4. Process according to Claim 1, comprising

bringing the aqueous treatment agent solution into contact with the semiconductor wafer by dipping the semiconductor wafer into the aqueous treatment agent solution.

5. Process according to Claim 1, comprising

bringing the aqueous treatment agent solution into contact with the semiconductor wafer by and applying the aqueous treatment agent solution to the polished surface of the semiconductor wafer by means of a cloth which has been moistened with the aqueous treatment agent solution.

6. Process according to Claim 1, comprising

bringing the semiconductor wafer into contact with the aqueous treatment agent solution in a polishing machine.

7. Process according to Claim 1, comprising

bringing the semiconductor wafer into contact with the aqueous treatment agent solution in an unloading station of a polishing machine.

8. The process as claimed in Claim 1, comprising

storing the semiconductor wafer in deionized water after contact with the aqueous treatment agent solution.

9. The process as claimed in Claim 1,

wherein the aqueous treatment agent solution comprises an aqueous solution of

(1) from 0.02% to 3.0% by volume, based upon the total solution volume, of an oxidizing agent;

(2) from 0.01% to 2.0% by weight, based upon the total solution weight, of an alkaline component; and

(3) the balance up to 100% by volume being water based upon the total solution volume, and the balance up to 100% by weight being water, which is based upon the total solution weight.

10. The process as claimed in Claim 1,

wherein the aqueous treatment agent is at a temperature range of from 18°C to 65°C.

11. The process as claimed in Claim 2,

wherein the oxidizing agent is hydrogen peroxide and the alkaline component is selected from the group consisting of tetramethylammonium hydroxide, ammonium hydroxide, potassium hydroxide, sodium hydroxide, potassium carbonate and the mixtures thereof.

12. The process as claimed in Claim 9,

wherein the oxidizing agent is hydrogen peroxide and the alkaline component is selected from the group consisting of tetramethylammonium hydroxide, ammonium hydroxide, potassium hydroxide, sodium hydroxide, potassium carbonate and the mixtures thereof.

# ABSTRACT OF THE DISCLOSURE

A process is provided for treating a polished semiconductor wafer immediately after the semiconductor wafer has been polished. The semiconductor wafer is brought into contact with an aqueous treatment agent solution and its polished surface is oxidized by the action of the aqueous treatment agent solution.





0370  
0500

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Fenghua Liu et al.

Serial No.: 09/032,305

Art Unit:

Filed: 02/27/98

Examiner:

Title: Vector Quantization in CELP Speech Coder

Attorney Docket No.: 365P007118-US (PAR)

Commissioner of Patents and Trademarks

Washington DC 20231

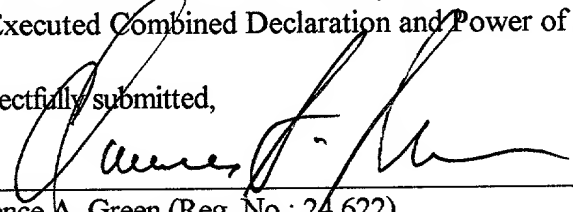
TRANSMITTAL OF DECLARATION AND POWER OF ATTORNEY AND ASSIGNMENT  
FORMS BEFORE THE ISSUANCE OF A NOTICE TO FILE MISSING PARTS

Sir:

Submitted herewith, before the issuance of a Notice to File Missing Parts, are the following papers:

1. Executed Assignment of Invention (Multiple Inventors)
2. Recordation Form Cover Sheet; and
3. Executed Combined Declaration and Power of Attorney

Respectfully submitted,

  
Clarence A. Green (Reg. No.: 24,622)  
Perman & Green, LLP  
425 Post Road  
Fairfield CT 06430

5-20-98  
Date

Telephone: 203/259-1800  
Facsimile: 203/255-5170

CERTIFICATE OF MAILING

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Name of Person Making Deposit

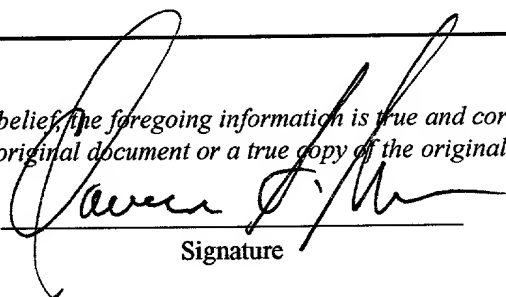
5.20.98  
Date

MAY 20 1998

# **RECORDATION FORM COVER SHEET PATENTS ONLY**

Commissioner of Patents and Trademarks, Washington, D.C. 20231

Please record the attached document

<b>1. Name of conveying party(ies):</b>  Alireza Ryan Heidari and Fenghua Liu  Additional name(s) of conveying party(ies) attached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		<b>2. Name and address of receiving party(ies):</b>  Name: Nokia Mobile Phones Limited  Address: Keilalahdentie 4  City: 02150 Espoo State: ZIP Code:  Country: Finland  Additional name(s) & address(es) attached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
<b>3. Nature of Conveyance:</b>  <input checked="" type="checkbox"/> Assignment <input type="checkbox"/> Merger <input type="checkbox"/> Security Agreement <input type="checkbox"/> Change of Name <input type="checkbox"/> Other:  Execution Date: 5/18/98			
<b>4. Application number(s) or patent number(s):</b> If this document is being filed together with a new application, the execution date of the application is: A. Patent Application No.(s): 09/032,205 B. Patent No.(s):  Additional numbers attached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			
<b>5. Name and address of party to whom correspondence concerning document should be mailed:</b>  Name: David M. Warren, Esq. Address: Perman & Green, LLP 425 Post Road  City: Fairfield  State: CT ZIP Code: 06430-6232		<b>6. Total number of applications and/or patents involved:</b> ..... 1 <b>7. Total fee (37 CFR 3.41):</b> .....\$40.00  <input checked="" type="checkbox"/> Enclosed <input type="checkbox"/> Charge deposit account <input checked="" type="checkbox"/> Please charge any fee deficiency to deposit account  <b>8. Deposit account number:</b> <u>16-1350</u>	
DO NOT USE THIS SPACE			
<b>9. Statement And Signature:</b>  <p align="center"><i>To the best of my knowledge and belief, the foregoing information is true and correct and, the attached document is either an original document or a true copy of the original document.</i></p> <div style="display: flex; justify-content: space-between;"> <div> <u>Clarence A. Green</u>            Name of Person Signing         </div> <div style="text-align: center;">             Signature         </div> <div> <u>5/20/98</u>            Date         </div> </div> <p align="right">Total number of pages including cover sheet(s): 5</p> <p align="right">Page 1 of 1.</p>			

Practitioner's Docket No. 365P007118-US (PAR)

**PATENT**

For: ☒ U.S. and/or ☒ Foreign Rights

For: ☒ U.S. Application or

☐ U.S. Provisional Application

For: ☐ U.S. Patent

For: ☐ PCT Application

By: Multiple Inventors

**ASSIGNMENT OF INVENTION (MULTIPLE INVENTORS)**

In consideration of the payment by ASSIGNEE to ASSIGNOR of the sum of One Dollar (\$1.00), the receipt of which is hereby acknowledged, and for other good and valuable consideration,

**ASSIGNORS (Inventors):**

Alireza Ryan Heidari

*(type or print name of inventors)*

Fenghua Liu

1243 Calle Christopher Court  
Encinitas CA 92024

USA

Address Nationality  
7675 Palmilla Drive, #6210  
San Diego CA 92122

Canada

hereby sells, assigns and transfers to

ASSIGNEE:

Nokia Mobile Phones Limited Keilalahdentie 4  
(type or print name of ASSIGNEE) Address  
02150 Espoo, Finland  
Nationality

and the successors, assigns and legal representatives of the ASSIGNEE

(complete one of the following)

- ☒ the entire right, title and interest  
☐ an undivided \_\_\_\_\_ percent ( \_\_\_\_ %) interest  
for the United States and its territorial possessions

(check the following box, if foreign rights are also to be assigned)

- ☒ and in all foreign countries, including all rights to claim priority  
in and to any and all improvements which are disclosed in the invention entitled:

Vector Quantization in CELP Speech Coder

(check and complete (a), (b), (c), (d), (e), (f), or (g))

and which is found in

- (a) ☐ U.S. patent application executed on even date herewith  
(b) ☐ U.S. patent application executed on \_\_\_\_\_  
(c) ☐ U.S. provisional application naming the above inventor(s) for the above-entitled invention  
☐ Express mail label no.: \_\_\_\_\_  
Mailed: \_\_\_\_\_  
☐ To comply with 37 CFR 3.21 for recordal of this assignment, I, an ASSIGNOR signing below, hereby authorize and request my attorney to insert below the filing date and application number when they become known.  
(d) ☒ U.S. application no. 09 / 032,205 filed on 2/27/98  
(e) ☐ International application no. PCT / \_\_\_\_\_ / \_\_\_\_\_  
filed on \_\_\_\_\_  
(f) ☐ U.S. patent no. \_\_\_\_\_ issued \_\_\_\_\_  
☐ A change of address to which correspondence is to be sent regarding patent maintenance fees is being sent separately.

(check (g), if foreign application(s) is also being assigned)

- (g) ☒ and any legal equivalent thereof in a foreign country, including the right to claim priority

and, in and to, all Letters Patent to be obtained for said invention by the above application or any continuation, division, renewal, or substitute thereof, and as to letters patent any reissue or re-examination thereof.

ASSIGNOR hereby covenants that no assignment, sale, agreement or encumbrance has been or will be made or entered into which would conflict with this assignment.

ASSIGNOR further covenants that ASSIGNEE will, upon its request, be provided promptly with all pertinent facts and documents relating to said invention and said Letters Patent and legal equivalents as may be known and accessible to ASSIGNOR and will testify as to the same in any interference, litigation or proceeding related thereto and will promptly execute and deliver to ASSIGNEE or its legal representatives any and all papers, instruments or affidavits required to apply for, obtain, maintain, issue and enforce said application, said invention and said Letters Patent and said equivalents thereof which may be necessary or desirable to carry out the purposes thereof.

IN WITNESS WHEREOF, We have hereunto set hand and seal this 21 8/98  
Date of signing

**WARNING:** The date of signing must be the same as the date of execution of the application, if item (a) was checked above.

Alireza Ryan Heidari  
(type name of Inventor)

Fenghua Liu

  
Signature of INVENTOR

☒ Notarization or Legalization Page Added.

**NOTE:** No witnessing, notarization or legalization is necessary. If the assignment is notarized or legalized then it will only be prima facie evidence of execution. 35 USC 261. Use next page if notarization is desired.

## NOTARIZATION OR LEGALIZATION ACCOMPANYING ASSIGNMENT

NOTE: Executing this page is not required for assignment, and is only prima facie evidence of execution. 35 USC 261.

Details of Country United States  
and place of signing of assignment San Diego  
California

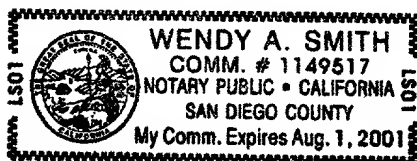
Before me this 18<sup>th</sup> day of May 1998, personally appeared the above named individual(s), to me known to be the person(s) who ☐ is ☒ are described in, and who executed the foregoing assignment instrument and acknowledged to me that

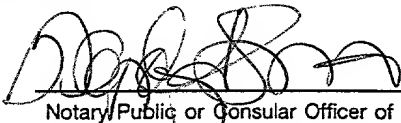
☐ he☐ his☐ she

executed the same of

☐ her☒ they☒ their

own free will for the purpose therein expressed.



  
Notary Public or Consular Officer of the  
United States of America

MAY 2 5 1993

**COMBINED DECLARATION AND POWER OF ATTORNEY**

(ORIGINAL, DESIGN, NATIONAL STAGE OF PCT, SUPPLEMENTAL, DIVISIONAL,  
CONTINUATION, OR C-I-P)

As a below named inventor, I hereby declare that:

**TYPE OF DECLARATION**

This declaration is of the following type:

*(check one applicable item below)*

- ☒ original.
- ☐ design.
- ☐ supplemental.

**NOTE:** If the declaration is for an International Application being filed as a divisional, continuation or continuation-in-part application, do not check next item; check appropriate one of last three items.

- ☐ national stage of PCT.

**NOTE:** If one of the following 3 items apply, then complete and also attach **ADDED PAGES FOR DIVISIONAL, CONTINUATION OR C-I-P.**

**NOTE:** See 37 C.F.R. § 1.63(d) (continued prosecution application) for use of a prior nonprovisional application declaration in the continuation or divisional application being filed on behalf of the same or fewer of the inventors named in the prior application.

- ☐ divisional.
- ☐ continuation.

**NOTE:** Where an application discloses and claims subject matter not disclosed in the prior application, or a continuation or divisional application names an inventor not named in the prior application, a continuation-in-part application must be filed under 37 C.F.R. § 1.53(b) (application filing requirements — nonprovisional application).

- ☐ continuation-in-part (C-I-P).

**INVENTORSHIP IDENTIFICATION**

**WARNING:** If the inventors are each not the inventors of all the claims, an explanation of the facts, including the ownership of all the claims at the time the last claimed invention was made, should be submitted.

My residence, post office address and citizenship are as stated below, next to my name. I believe that I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter that is claimed, and for which a patent is sought on the invention entitled:

**TITLE OF INVENTION**

Vector Quantization in CELP Speech Coder

## SPECIFICATION IDENTIFICATION

the specification of which:

(complete (a), (b), or (c))

(a) ☐ is attached hereto.

NOTE: "The following combinations of information supplied in an oath or declaration filed on the application filing date with a specification are acceptable as minimums for identifying a specification and compliance with any one of the items below will be accepted as complying with the identification requirement of 37 CFR 1.63:

"(1) name of inventor(s), and reference to an attached specification which is both attached to the oath or declaration at the time of execution and submitted with the oath or declaration on filing;

"(2) name of inventor(s), and attorney docket number which was on the specification as filed; or

"(3) name of inventor(s), and title which was on the specification as filed."

Notice of July 13, 1995 (1177 O.G. 60).

(b) ☒ was filed on 2/27/98, as ☒ Serial No. 0 9 032,205  
or ☐ \_\_\_\_\_  
and was amended on \_\_\_\_\_ (if applicable).

NOTE: Amendments filed after the original papers are deposited with the PTO that contain new matter are not accorded a filing date by being referred to in the declaration. Accordingly, the amendments involved are those filed with the application papers or, in the case of a supplemental declaration, are those amendments claiming matter not encompassed in the original statement of invention or claims. See 37 CFR 1.67.

NOTE: "The following combinations of information supplied in an oath or declaration filed after the filing date are acceptable as minimums for identifying a specification and compliance with any one of the items below will be accepted as complying with the identification requirement of 37 CFR 1.63:

"(1) name of inventor(s), and application number (consisting of the series code and the serial number; e.g., 08/123,456);

"(2) name of inventor(s), serial number and filing date;

"(3) name of inventor(s) and attorney docket number which was on the specification as filed;

"(4) name of inventor(s), title which was on the specification as filed and filing date;

"(5) name of inventor(s), title which was on the specification as filed and reference to an attached specification which is both attached to the oath or declaration at the time of execution and submitted with the oath or declaration; or

"(6) name of inventor(s), title which was on the specification as filed and accompanied by a cover letter accurately identifying the application for which it was intended by either the application number (consisting of the series code and the serial number; e.g., 08/123,456), or serial number and filing date. Absent any statement(s) to the contrary, it will be presumed that the application filed in the PTO is the application which the inventor(s) executed by signing the oath or declaration."

Notice of July 13, 1995 (1177 O.G. 60).

(c) ☐ was described and claimed in PCT International Application No. \_\_\_\_\_, filed on \_\_\_\_\_ and as amended under PCT Article 19 on \_\_\_\_\_ (if any).



## **SUPPLEMENTAL DECLARATION (37 C.F.R. § 1.67(b))**

*(complete the following where a supplemental declaration is being submitted)*

- ☐ I hereby declare that the subject matter of the
- ☐ attached amendment
  - ☐ amendment filed on \_\_\_\_\_

was part of my/our invention and was invented before the filing date of the original application, above-identified, for such invention.

### **ACKNOWLEDGEMENT OF REVIEW OF PAPERS AND DUTY OF CANDOR**

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information, which is material to patentability as defined in 37, Code of Federal Regulations, § 1.56,

*(also check the following items, if desired)*

- ☐ and which is material to the examination of this application, namely, information where there is a substantial likelihood that a reasonable Examiner would consider it important in deciding whether to allow the application to issue as a patent, and
- ☐ in compliance with this duty, there is attached an information disclosure statement, in accordance with 37 CFR 1.98.

### **PRIORITY CLAIM (35 U.S.C. §§ 119(a)-(d))**

**NOTE:** "The claim to priority need be in no special form and may be made by the attorney or agent if the foreign application is referred to in the oath or declaration as required by § 1.63. The claim for priority and the certified copy of the foreign application specified in 35 U.S.C. 119(b) must be filed in the case of an interference (§ 1.630), when necessary to overcome the date of a reference relied upon by the examiner, when specifically required by the examiner, and in all other situations, before the patent is granted. If the claim for priority or the certified copy of the foreign application is filed after the date the issue fee is paid, it must be accompanied by a petition requesting entry and by the fee set forth in § 1.17(i). If the certified copy is not in the English language, a translation need not be filed except in the case of interference; or when necessary to overcome the date of a reference relied upon by the examiner; or when specifically required by the examiner, in which event an English language translation must be filed together with a statement that the translation of the certified copy is accurate." 37 C.F.R. § 1.55(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §§ 119(a)-(d) of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed.

*(complete (d) or (e))*

- (d) ☒ no such applications have been filed.
- (e) ☐ such applications have been filed as follows.

**NOTE:** Where item (c) is entered above and the International Application which designated the U.S. itself claimed priority check item (e), enter the details below and make the priority claim.

**PRIOR FOREIGN/PCT APPLICATION(S) FILED WITHIN 12 MONTHS  
(6 MONTHS FOR DESIGN) PRIOR TO THIS APPLICATION  
AND ANY PRIORITY CLAIMS UNDER 35 U.S.C. § 119(a)-(d)**

COUNTRY (OR INDICATE IF PCT)	APPLICATION NUMBER	DATE OF FILING (day, month, year)	PRIORITY CLAIMED UNDER 37 USC 119
			<input type="checkbox"/> YES    NO <input type="checkbox"/>
			<input type="checkbox"/> YES    NO <input type="checkbox"/>
			<input type="checkbox"/> YES    NO <input type="checkbox"/>
			<input type="checkbox"/> YES    NO <input type="checkbox"/>
			<input type="checkbox"/> YES    NO <input type="checkbox"/>

**CLAIM FOR BENEFIT OF PRIOR U.S. PROVISIONAL APPLICATION(S)**  
(34 U.S.C. § 119(e))

I hereby claim the benefit under Title 35, United States Code, § 119(e) of any United States provisional application(s) listed below:

**PROVISIONAL APPLICATION NUMBER**

**FILING DATE**

\_\_\_\_ / \_\_\_\_\_  
 \_\_\_\_ / \_\_\_\_\_  
 \_\_\_\_ / \_\_\_\_\_

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**CLAIM FOR BENEFIT OF EARLIER US/PCT APPLICATION(S)  
UNDER 35 U.S.C. 120**

- ☐ The claim for the benefit of any such applications are set forth in the attached ADDED PAGES TO COMBINED DECLARATION AND POWER OF ATTORNEY FOR DIVISIONAL, CONTINUATION OR CONTINUATION-IN-PART (C-I-P) APPLICATION.

**ALL FOREIGN APPLICATION(S), IF ANY, FILED MORE THAN 12 MONTHS  
(6 MONTHS FOR DESIGN) PRIOR TO THIS U.S. APPLICATION**

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NOTE: If the application filed more than 12 months from the filing date of this application is a PCT filing forming the basis for this application entering the United States as (1) the national stage, or (2) a continuation, divisional, or continuation-in-part, then also complete **ADDED PAGES TO COMBINED DECLARATION AND POWER OF ATTORNEY FOR DIVISIONAL, CONTINUATION OR C-I-P APPLICATION** for benefit of the prior U.S. or PCT application(s) under 35 U.S.C. § 120.

**POWER OF ATTORNEY**

I hereby appoint the following practitioner(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

*(list name and registration number)*

Clarence A. Green (24,622)  
David M. Warren (25,520)  
Mark F. Harrington (31,686)  
Harry F. Smith (32,493)

*(check the following item, if applicable)*

- ☐ I hereby appoint the practitioner(s) associated with the Customer Number provided below to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith.
- ☐ Attached, as part of this declaration and power of attorney, is the authorization of the above-named practitioner(s) to accept and follow instructions from my representative(s).

---

SEND CORRESPONDENCE TO

DIRECT TELEPHONE CALLS TO:  
*(Name and telephone number)*

☒ Address

David M. Warren, Esq.  
Perman & Green, LLP  
425 Post Road  
Fairfield CT 06430

David M. Warren  
203/259-1800

☐ Customer Number \_\_\_\_\_

---

## DECLARATION

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

## SIGNATURE(S)

NOTE: Carefully indicate the family (or last) name, as it should appear on the filing receipt and all other documents.

Full name of sole or first inventor

Alireza  
(GIVEN NAME)

Ryan  
(MIDDLE INITIAL OR NAME)

Heidari  
FAMILY (OR LAST NAME)

Inventor's signature [Signature]

Date 5/18/98 Country of Citizenship USA

Residence Encinitias, California

Post Office Address 1243 Calle Christopher Court, Encinitias, CA 92024

Full name of second joint inventor, if any

Fenghua  
(GIVEN NAME)

[Signature]  
(MIDDLE INITIAL OR NAME)

Liu  
FAMILY (OR LAST NAME)

Inventor's signature [Signature]

Date 5/18/1998 Country of Citizenship Canada

Residence San Diego, California

Post Office Address 7675 Palmilla Drive #6210, San Diego, CA 92122

Full name of third joint inventor, if any

(GIVEN NAME)

(MIDDLE INITIAL OR NAME)

FAMILY (OR LAST NAME)

Inventor's signature \_\_\_\_\_

Date \_\_\_\_\_ Country of Citizenship \_\_\_\_\_

Residence \_\_\_\_\_

Post Office Address \_\_\_\_\_

(check proper box(es) for any of the following added page(s)  
that form a part of this declaration)

- ☐ **Signature** for fourth and subsequent joint inventors. *Number of pages added* \_\_\_\_\_

\* \* \*

- ☐ **Signature** by administrator(trix), executor(trix) or legal representative for deceased or incapacitated inventor. *Number of pages added* \_\_\_\_\_

\* \* \*

- ☐ **Signature** for inventor who refuses to sign or cannot be reached by person authorized under 37 CFR 1.47. *Number of pages added* \_\_\_\_\_

\* \* \*

- ☐ Added page for **signature** by one joint inventor on behalf of deceased inventor(s) where legal representative cannot be appointed in time. (37 CFR 1.47)

\* \* \*

- ☐ Added pages to combined declaration and power of attorney for divisional, continuation, or continuation-in-part (C-I-P) application.

☐ Number of pages added \_\_\_\_\_

\* \* \*

- ☐ Authorization of practitioner(s) to accept and follow instructions from representative.

\* \* \*

(if no further pages form a part of this Declaration,  
then end this Declaration with this page and check the following item)

- ☒ This declaration ends with this page.

**Declaration and Power of Attorney for Patent Application**  
**Erklärung für Patentanmeldungen mit Vollmacht**  
**German Language Declaration**

Als nachstehend benannter Erfinder erkläre ich hiermit an Eides statt:

dass mein Wohnsitz, meine Postanschrift, und meine Staatsangehörigkeit den im Nachstehenden nach meinem Namen aufgeführten Angaben entsprechen.

dass ich, nach bestem Wissen, der ursprüngliche, erste und alleinige Erfinder (falls nachstehend nur ein Name angegeben ist) oder ein ursprünglicher, erster und Miterfinder (falls nachstehend mehrere Namen aufgeführt sind) des Gegenstandes bin, für den dieser Antrag gestellt wird und für den ein Patent beantragt wird für die Erfindung mit dem Titel:

Process for Treating a Polished Semiconductor

Wafer Immediately After the Semiconductor

Wafer Has Been Polished

deren Beschreibung

(Zutreffendes ankreuzen)

☒ hier beigefügt ist.  
☐ am \_\_\_\_\_ unter der

Anmeldungsnummer \_\_\_\_\_

eingereicht wurde und am \_\_\_\_\_  
abgeändert wurde (falls tatsächlich abgeändert).

Ich bestätige hiermit, dass ich den Inhalt der obigen Patentanmeldung, einschliesslich der Ansprüche, durchgesehen und verstanden habe, die eventuell durch einen Zusatzantrag wie oben erwähnt abgeändert wurde.

Ich erkenne meine Pflicht zur Offenbarung irgendwelcher Informationen, die für die Prüfung der vorliegenden Anmeldung in Einklang mit Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) von Wichtigkeit sind, an.

Ich beanspruche hiermit ausländische Prioritätsvorteile gemäss Abschnitt 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 119, aller unten angegebenen Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde, und habe auch alle Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde nachstehend gekennzeichnet, die ein Anmeldedatum haben, das vor dem Anmeldedatum der Anmeldung liegt, für die Priorität beansprucht wird.

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

Process for Treating a Semiconductor

Wafer Immediately After the Semiconductor

Wafer Has Been Polished

the specification of which  
(check one)

☒ is attached hereto.  
☐ was filed on \_\_\_\_\_ as

Application Serial No. \_\_\_\_\_

and was amended on \_\_\_\_\_  
(if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a)

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

# German Language Declaration

Prior foreign applications  
Vorherige Anmeldungen

197 09 217.9  
(Number)  
(Nummer)

Germany  
(Country)  
(Land)

6 March 1997  
(Day/Month/Year Filed)  
(Tag/Monat/Jahr eingereicht)

Priority Claimed  
Priorität beansprucht  
☒ Yes  
Ja

(Number)  
(Nummer)

(Country)  
(Land)

(Day/Month/Year Filed)  
(Tag/Monat/Jahr eingereicht)

☐ Yes  
Ja

(Number)  
(Nummer)

(Country)  
(Land)

(Day/Month/Year Filed)  
(Tag/Monat/Jahr eingereicht)

☐ Yes  
Ja

Ich beanspruche hiermit gemäss Absatz 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 120, den Vorzug aller unten aufgeführten Anmeldungen, und falls der Gegenstand aus jedem Anspruch dieser Anmeldung nicht in einer früheren amerikanischen Patentanmeldung laut dem ersten Paragraphen des Absatzes 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 112 offenbart ist, erkenne ich gemäss Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a), meine Pflicht zur Offenbarung von Informationen an, die zwischen dem Anmeldedatum der früheren Anmeldung und dem nationalen oder PCT internationalen Anmeldedatum dieser Anmeldung bekannt geworden sind.

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

(Application Serial No.)  
(Anmeldeseriennummer)

(Filing Date)  
(Anmeldedatum)

(Status)  
(patentiert, anhängig,  
aufgegeben)

(Status)  
(patented, pending  
abandoned)

(Application Serial No.)  
(Anmeldeseriennummer)

(Filing Date)  
(Anmeldedatum)

(Status)  
(patentiert, anhängig,  
aufgegeben)

(Status)  
(patented, pending  
abandoned)

Ich erkläre hiermit, dass alle von mir in der vorliegenden Erklärung gemachten Angaben nach meinem besten Wissen und Gewissen der vollen Wahrheit entsprechen, und dass ich diese eidesstattliche Erklärung in Kenntnis dessen abgebe, dass wissentlich und vorsätzlich falsche Angaben gemäss Paragraph 1001, Absatz 18 der Zivilprozessordnung der Vereinigten Staaten von Amerika mit Geldstrafe belegt und/oder Gefängnis bestraft werden koennen, und dass derartig wissentlich und vorsätzlich falsche Angaben die Gültigkeit der vorliegenden Patentanmeldung oder eines darauf erteilten Patentes gefährden können.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

## German Language Declaration

**VERTRETUNGSVOLLMACHT:** Als benannter Erfinder beauftrage ich hiermit den nachstehend benannten Patentanwalt (oder die nachstehend benannten Patentanwälte) und/oder Patent-Agenten mit der Verfolgung der vorliegenden Patentanmeldung sowie mit der Abwicklung aller damit verbundenen Geschäfte vor dem Patent-und Warenzeichenamt:

**POWER OF ATTORNEY:** As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith:

ALLISON C. COLLARD, Registration No. 22,532

EDWARD R. FREEDMAN, Registration No. 26,048

ELIZABETH COLLARD RICHTER, Registration No. 35,103

WILLIAM C. COLLARD, Registration No. 38,411

Telefongspräche bitte richten an:

(516) 365-9802

Direct Telephone call to:



(516)365-9802

Postanschrift:

COLLARD & ROE, P.C.  
1077 Northern Boulevard  
Roslyn, New York 11576

Send Correspondence to:

COLLARD & ROE, P.C.  
1077 Northern Boulevard  
Roslyn, New York 11576

<b>1. Full name of sole or first inventor</b> (Voller Name des einzigen oder ursprünglichen Erfinders) Heinrich HENNHÖFER		<b>2. Full name of additional or joint inventor (if any)</b> (Voller Name des Miterfinders) (falls zutreffend) Thomas BUSCHHARDT	
<b>Inventor's Signature</b> (Unterschrift des Erfinders) 	<b>Date</b> (Datum) 19.2.98	<b>Additional inventor's signature</b> (Unterschrift des Miterfinders) 	<b>Date</b> (Datum) 19.02.1998
<b>Residence</b> (Wohnsitz) Altoetting, Germany		<b>Residence</b> (Wohnsitz) Burghausen, Germany	
<b>Citizenship</b> (Staatsangehörigkeit) German		<b>Citizenship</b> (Staatsangehörigkeit) German	
<b>Post Office Address</b> (Postanschrift) Sr.-Edith-Stein-Strasse 5		<b>Post Office Address</b> (Postanschrift) Am Forstpoint 18	
D-84503 Altoetting, Germany		D-84489 Burghausen, Germany	



3. Full name of additional or joint inventors (if any) (Voller Name des Miterfinders)  Franz MANGS		4. Full name of additional or joint inventor (if any) (Voller Name des Miterfinders) (falls zutreffend)  Gerlinde WENSAUER	
Additional Inventor's Signature (Unterschrift des Miterfinders)  <i>Franz Mangs</i>		Additional inventor's signature (Unterschrift des Miterfinders)  <i>Wensauer Gerlinde</i>	
Date (Datum)  19.2.98		Date (Datum)  19.02.98	
Residence (Wohnsitz)  Tittmoning, Germany		Residence (Wohnsitz)  Altoetting, Germany	
Citizenship (Staatsangehörigkeit)  German		Citizenship (Staatsangehörigkeit)  German	
Post Office Address (Postanschrift)  Ranharting 8		Post Office Address (Postanschrift)  Kolpingstrasse 20	
D-84569 Tittmoning, Germany		D-84503 Altoetting, Germany	
5. Full name of additional or joint inventors (if any) (Voller Name des Miterfinders)		6. Full name of additional or joint inventor (if any) (Voller Name des Miterfinders) (falls zutreffend)	
Additional Inventor's Signature (Unterschrift des Miterfinders)		Additional inventor's signature (Unterschrift des Miterfinders)	
Date (Datum)		Date (Datum)	
Residence (Wohnsitz)		Residence (Wohnsitz)	
Citizenship (Staatsangehörigkeit)		Citizenship (Staatsangehörigkeit)	
Post Office Address (Postanschrift)		Post Office Address (Postanschrift)	